

COMPOST

END USE WORKSHOP



Goals

- **Develop overall understanding of compost end use and related issues**
- **Assist end users understand compost quality**
- **Assist potential end users to better choose/purchase the product they require**

Course Overview

1. Welcome

2. Compost – What is it and Why use it?

(what it is...what it's not, definitions, benefits)

3. Compost Quality Issues

(importance of specific characteristics, feedstocks vs. characteristics, realistic ranges, comparing compost to other products)

4. Buying Compost

(lowa sources, compost suppliers, evaluating compost samples and test results)

Course Overview

5. Landscape/Turf Applications

(turf establishment and maintenance, commercial vs. sports turf, planting beds, mulching, topsoil manufacturing, tree/shrub planting)

6. Roadside and Erosion Control

(upgrading marginal soils, vegetation establishment, erosion control)

7. Iowa Compost Use Projects and Pending Specifications

(a review of Iowa compost use projects, SUDAS, IA DOT)

8. Wrap Up

Economics of Compost Use

Compost is often less expensive than competing products...

...but it's more expensive than doing nothing

What costs more...

...doing it correctly the first time, or doing it incorrectly and having to come back and fix it?

Economics of Compost Use

Less plant loss 'in the field'

'Insurance'

Faster establishment and growth

***Fix the soil! Healthy soil is key to
long-term success***

Topsoil and Planting Holes

- Topsoil
 - Price, volume, application cost
 - Topsoil - \$7.00 - \$15.00/ton (\$10.22 - \$22.50 CY), 1,206 T/A for 6" (804 CY) = **\$5,628 - \$12,060**
 - Compost - \$10.00 - \$15.00/CY, 269 CY for 2" = **\$2,690 - \$4,035**
- Planting Holes
 - Price, volume, application cost
 - Compost - **\$0.50 - \$2.00** tree (at 1CF)

OTHER

ASK QUESTIONS!!!

Compost – What is it and Why Use it?

- What it is... what it's not
- Definitions
- Benefits



What it's not...

- **Topsoil**

- long-term structural stability, less shrinkage
- *'Black dirt'*

- **Peat**

- older organic matter source, no nutrients, less biologically active, less renewable

- **Fertilizer**

- more predictable nutrient release

EXCEPTIONS

What it is...

- Stabilized organic matter source
- Nutrient rich
- Biologically active



BUT also... unique, very versatile
(because it is what we produce it to be)

What is Composting

Composting is a controlled biologic process in which microorganisms convert organic materials into soil-like material called compost. Active composting is typically characterized by a high temperature phase, that sanitizes the organic materials and allows a high rate of decomposition. This is followed by a lower temperature phase that allows for the product to stabilize, while still decomposing at a lower rate.



Manufacturing process



What is Compost?

Compost is the product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth. Compost bears little resemblance to the raw material from which it originated.



Benefits of Compost Use

Physical:

- Improves soil structure
- Moisture management

Chemical:

- Modifies and stabilizes pH
- Increases cation exchange capacity
- Supplies nutrients

Biological:

- Supplies soil biota
- Suppresses plant diseases

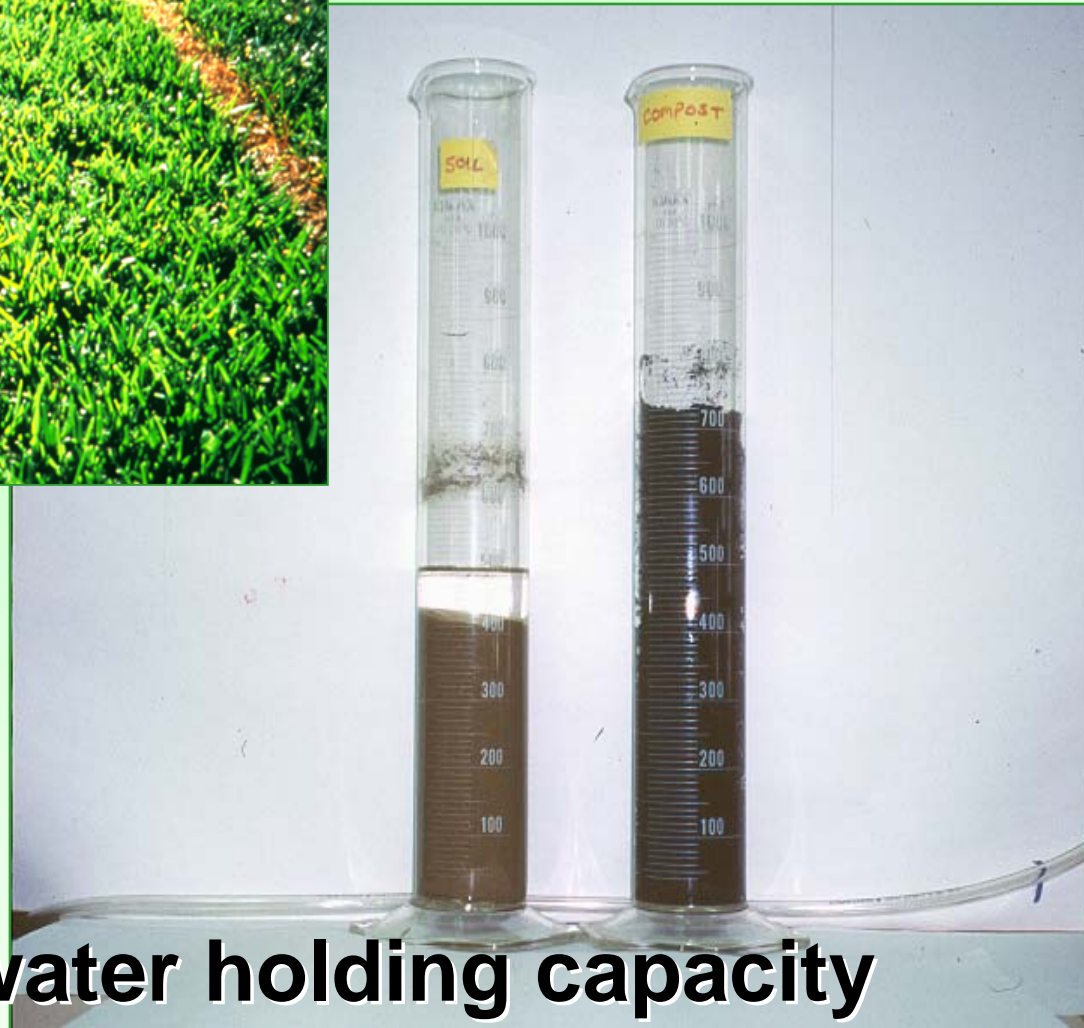
Other:

- Binds/degrades contaminants
- Binds nutrients

**Compost can
improve
soils...**

**physically,
chemically,
and
biologically**





Increased soil water holding capacity



Improved

- tilth
- reduced bulk density
- improved rooting

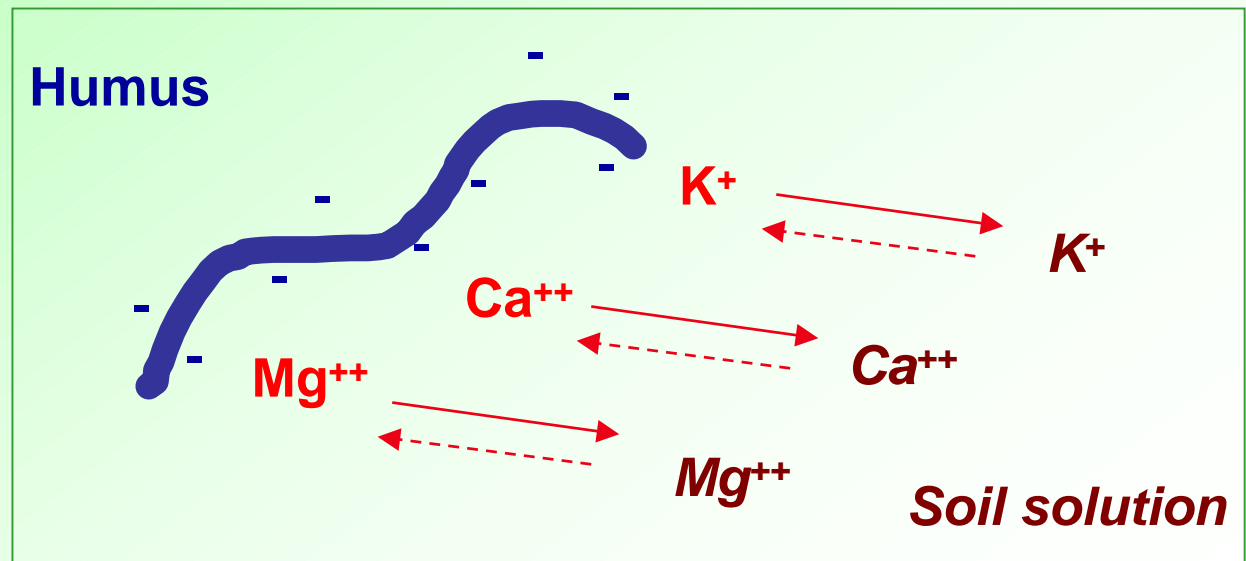




Supplies macro
and micro nutrients

Nutrient
reservoir:

cation
exchange
capacity

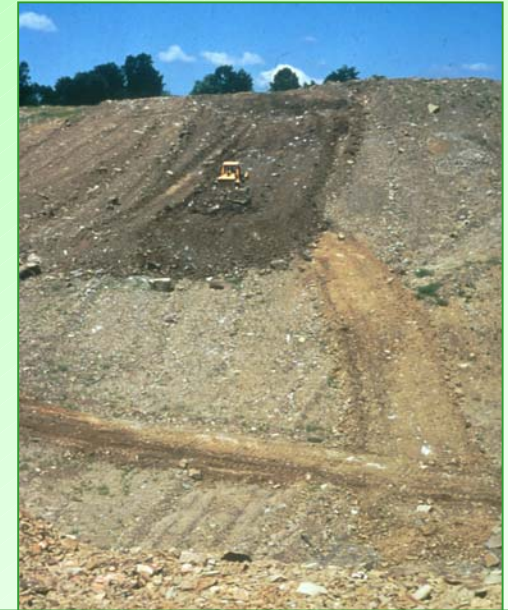


Nutrient Requirements/Supply

- Turfgrass 2-6lbs. N/1000 ft²
 - 1 ton compost (at 50% H₂O), each 1% N = 10lbs. N
 - ½ inch (34 tons) layer of compost/A = 340 lbs./N
 - at 25% available N (1st year) = 85 lbs./N/A or
approximately 2 lbs./1000 ft²

Consider garden beds, turf establishment

Degrades and binds contaminants



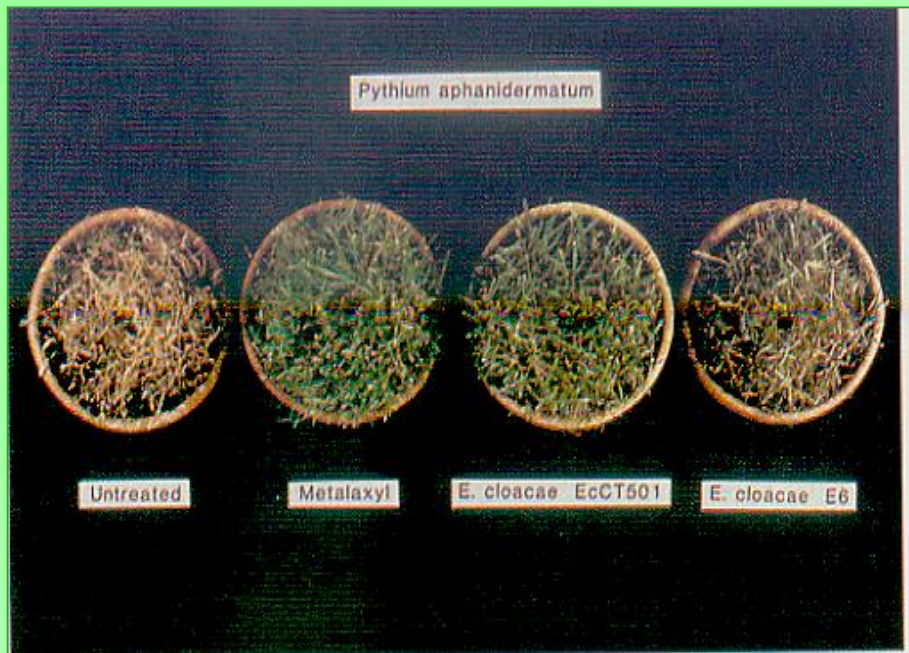
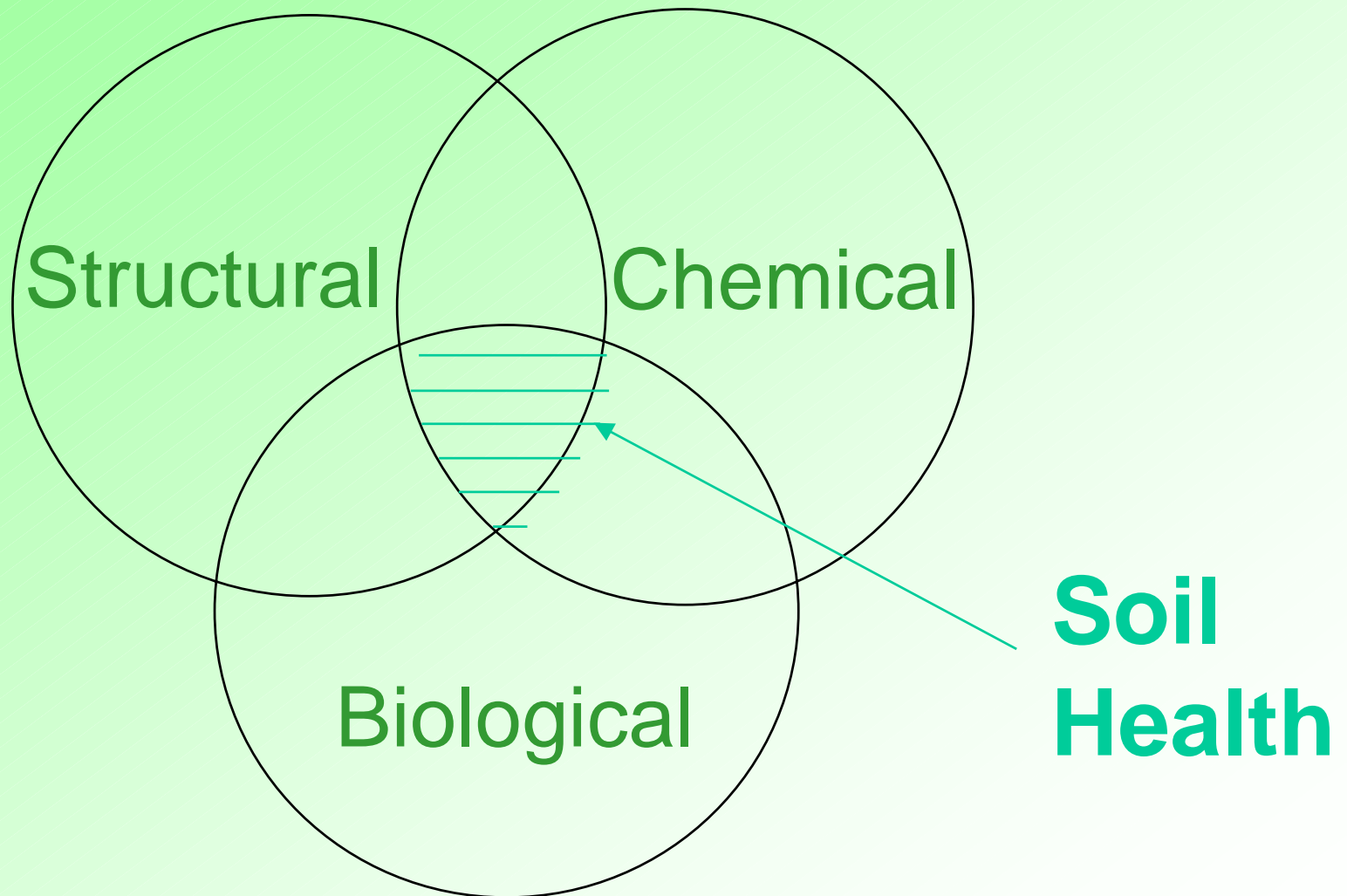


Fig. 6. Suppression of pythium blight on creeping bentgrass (Pennncross) by *Enterobacter cloacae* and the fungicide Subdue under growth chamber conditions

Suppresses soil
borne diseases



Emerging view of soil health



Questions?

Compost Quality Issues

- Importance of specific characteristics
- Realistic ranges
- Comparing compost to other products



**Acceptable
characteristics
vary by
application (use)**

**Quality means
different things
to different
people**



Acceptability of both product characteristic ranges and ongoing variance of those characteristics is dependant upon the market segment



Compost Parameters and their Rationale for Inclusion

Compost Parameters	Rationale for Inclusion
pH	Necessary for system management - Effect on pH adjustment.
Soluble Salt Concentration	Necessary for system management - Potential toxicity, effect on watering regime, effect on fertilizer application rates.
Nutrient Content (N-P-K, Ca, Mg)	Necessary for system management - Effect on fertilizer requirements.
Moisture Content	Product handling and transportation issue.
Organic Matter Content	Necessary for system management – Relevant in determining application rates. Some use as a basis to measure cost effectiveness, value.

Compost Parameters and their Rationale for Inclusion

Particle Size	Necessary for system management – Effect on porosity. May determine usability in specific applications
Trace Elements/ Heavy Metals	Necessary for system management - Effect on fertilizer requirements, potential toxicity. Necessary to address and reduce public concern.
Pathogens	Necessary to address and reduce public concern.
Stability	Necessary for system management - Effect on nutrient availability (nitrogen), odor generation.
Maturity	Necessary for system management – Effect of seed germination/plant growth.





**US COMPOSTING
COUNCIL**

*Seal of Testing
Assurance*

Barnes – Regional Composting
3511 West Cleveland Ave.
Huron, OH 44839
Telephone: 800-421-8722
Fax: 419-433-3555

Sample Date: 8/14/02

COMPOST TECHNICAL DATA SHEET

<i>Compost Parameters</i>	<i>Reported as (units of measure)</i>	<i>Test Results</i>	<i>Test Results</i>
<i>Plant Nutrients:</i>	% , weight basis	% , wet weight basis	% , dry weight basis
Nitrogen	Total N (TN or TKN+NO ₃ -N)	.72	1.12
Phosphorus	P ₂ O ₅	.13	.21
Potassium	K ₂ O	.32	.50
Calcium	Ca	2.34	3.64
Magnesium	Mg	.57	.89
Moisture Content	% , wet weight basis	42	
Organic Matter Content	% , dry weight basis	31.31	
pH	unitless	7.4	
Soluble Salts <i>(electrical conductivity)</i>	dS/m (mmhos/cm)	3.49	
Particle Size	screen size passing through	½"	
Stability Indicator <i>(respirometry)</i> CO ₂ Evolution	mg CO ₂ -C/g TS/day, AND	.14	
	mg CO ₂ -C/g OM/day	.5	
Maturity Indicator <i>(bioassay)</i> Percent Emergence, AND Relative Seedling Vigor	average % of control, AND	92	
	average % of control	86	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Label should be easy to understand

Provide:

- Analytical data
- Use directions
- Ingredient statement

Typical Characteristics of Municipal Feedstock-Based* Composts

Parameter	Typical Range	Preferred Range ¹
pH	5.0 – 8.5	6.5 – 8.0
Soluble Salts	1 – 15 mmhos/cm	5 mmhos/cm or below
Nutrient Content (dry weight basis)	N 0.5 - 2.5% P 0.2 - 2.0% K 0.3 – 1.5%	N 1% or above P .5% or above
Water Holding Capacity (dry weight basis)	75 – 200%	100% or above
Bulk Density	800-1400 lbs/yd ³	900-1100 lbs/yd ³

1 - Preferred range for various applications under average field conditions

* Municipal feedstock-based composts are primarily derived from yard trimmings, biosolids, MSW, or food by-products, or a combination of these feedstocks.

Typical Characteristics of Municipal Feedstock-Based Composts

Parameter	Typical Range	Preferred Range
Moisture Content	30 - 60%	40 - 50%
Organic Matter Content	30 - 70%	50 - 60%
Particle Size	--	Pass 3/8'' – 1/2'' or smaller screen
Trace Elements / Heavy Metals	--	Meet Federal and State Regulations
Growth Screening	--	Must pass seed germination, plant growth assays
Stability	--	Stable to highly stable

Modified from The Field Guide to Compost Use, US Composting Council, 1996

Monitor Product Quality

- **Prove product characteristics, consistency**
- **Prove product characteristics can meet end users requirements**

Certification programs are helpful for QA/QC



General Comparison of Compost to Other Horticultural/ Agricultural Products

	Compost	Canadian peat	Native peat	Mineral topsoil	Fresh manure	Ground pine bark
Macronutrients	medium - high	very low	very low	low	high	low
Micronutrients	medium - high	very low	very low	low - medium	medium - high	low
Soluble salts	low - medium	very low	very low	low	high - very high	low
pH	medium	low - very low	low - very low	medium	medium	low
Bulk density	medium	low	low	high	high	low
Moisture holding capacity	medium	very high	high	low	low - medium	low
Organic matter content	medium - high	very high	high	low	medium - high	medium - high
Stability in soil	good - excellent	excellent	excellent	n/a	low - medium	good - excellent
Microbial population	good - excellent	poor	poor	poor - good	good	good - excellent
Note: These are general guidelines. Individual products may vary. N/A = Not applicable						

Field Guide to Compost Use, US Composting Council, 1996

Comparison of Compost to Other Planting and Soil Amendments

	Compost	Organic Soil	Native Peat	Canadian Peat
Organic matter (%)	46	12	74	97
pH	7.4	7.5	5.2	4.2
Soluble salts (dS.m⁻¹)	2.23	0.64	0.31	0.07
Bulk density (kg.m⁻³)	515	1125	228	112
Bulk density (lbs. per ft³)	32.2	70.2	14.3	7.0
Moisture-holding capacity (%)	227	53	428	1307
Cation exchange capacity (meq per 100g)	17.3	13.6	4.0	3.1

Field Guide to Compost Use, US Composting Council, 1996

Compost is not 'Black Dirt'

	5 Soils*	4 Composts**
1. pH	6.35 - 7.35	6.8 – 8.1
2. EC (dS/m)	0.4 – 2.3	3.6 – 7.8
3. Organic Matter (%)	2.6 – 5.5	33.3 – 53.7
4. Total (%) Nitrogen	0.1 – 0.26	1.2 – 2.8

*ISU Soil Testing Lab

** STA Program Testing Labs

Questions?

Buying Compost

- The compost supplier
- Iowa sources
- Seal of Testing Assurance Program
- Evaluating compost samples and test results

Attributes of a Compost Supplier

- Produce compost possessing attributes / characteristics that meet end user or application requirements
- Supplies/produces a consistent product
- Has implemented an on-going quality assurance or testing program
- Can supply current compost characterization data (quantifying and qualifying their product's attributes)



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Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

**End users and
specifiers need
to know what
they're buying**

Label

•Characteristics

•Use directions

**•Ingredient
statement**

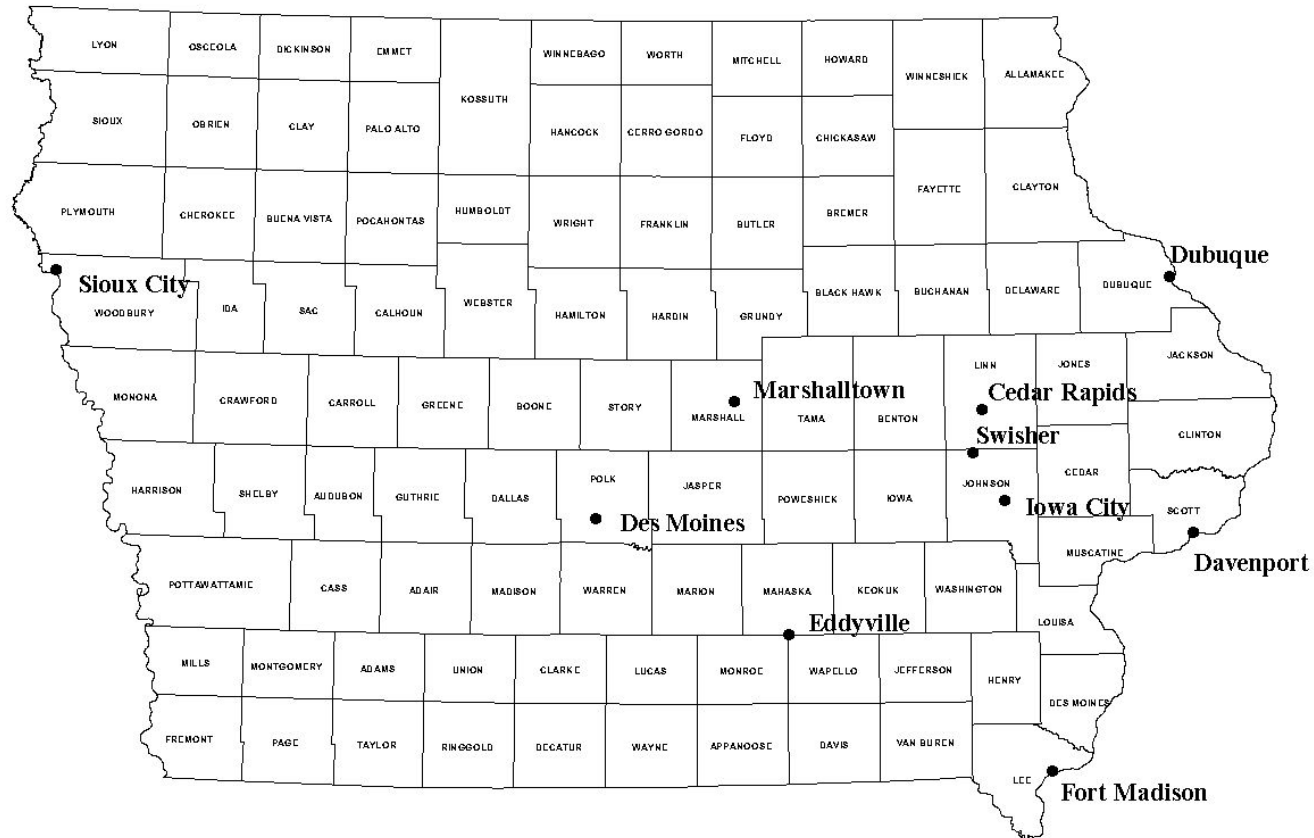
Attributes of a Compost Supplier

- Provides good overall customer service, employs a “service minded” staff
- Can assure prompt and reliable delivery (size of truck and mode of unloading are also important)
- Possesses adequate storage to ensure availability
- Can provide technical assistance regarding end use

Understand what you want and what you are buying...



Iowa Composting Facilities Selling Compost Commercially



- **Composting Facilities**

Note: These companies may have retail and wholesale outlets in other parts of Iowa.

Iowa Commercial Compost Sources

1. ***Bluestem Solid Waste Agency, Cedar Rapids – 319-398-1278**
2. ***Chamness Technology, Eddyville – 641-969-5702**
3. ***City of Davenport, Davenport – 319-328-7225**
4. ***Metro Waste Authority, Des Moines – 515-323-6525**
5. ***Enviro One, Dubuque – 563-557-2640**
6. **Marshalltown Composting and Tree Processing, Marshalltown – 641-754-5709**
7. **Iowa City Landfill, Iowa City – 319-356-5185**
8. **Great River Regional Waste Authority, Ft. Madison – 319-372-6140**
9. **Van Buskirk Construction, Sioux City – 712-255-8345**



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If it isn't STA Compost..... What is it?

Seal of Testing Assurance Program

What Is It?

- **Compost testing and information disclosure program (employing standardized practices)**

Purpose...

- **To assist compost end users purchase the product they require for their particular project**
- **To assure that compost end users know the characteristics of the compost products they purchase**
- **To improve overall customer confidence in compost selection and utilization**



Promoting the use of.....



the appropriate product for a particular project

**Promoting...
the proper use
of compost
products,
reducing
failures
in the 'field'**



STA Program Certified Composters will:

- **Complete on-going product testing (operate on-going sampling/testing regime, sampling methods)**
 - **Disclose test data results (lab analyses)**
 - **Provide appropriate end use instructions**
 - **Use uniform product label**
- * Treat compost like any other retail, horticultural, agricultural product marketed in the U.S.***





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Directions for Product Use:

New Lawns: Apply a 1-2" layer to soil and incorporate to a depth of 5-7", apply seed, then rake and water.

Flower Beds: Apply a 1-2" layer to soil and incorporate to a 6-8" depth. Condition soil this way every year to 2 years. Plant flowers and water.

Trees & Shrubs: Dig a hole 2/3 the depth of the root ball and at least twice as wide. Mix 1 part compost with 2 parts soil obtained from the planting hole. Place the tree or shrub in the planting hole and apply amended soil around the root ball. Firm soil occasionally and water.

Topsoil Manufacturing/Upgrading: Mix 1 part compost with 2 parts existing or purchased soil and blend uniformly.

Growing Mixes: Planter box or raised bed mixes can be produced by mixing 1 part compost to 1 part pine bark and 1 part soil, sand or expanded shale. Potting mixes should contain 1 part compost, 1 part peat moss or pine bark, and 1 part perlite, vermiculite, styrofoam, or other aggregate.

Mulching: Spread a 2-3" layer around trees, shrubs, and flowers. Always avoid placing mulches against plant trunks and stems.

Garden Beds (food crops): Apply a 1-2" layer to soil and till to a 6-8" depth. Reapply each year, or as per soil test recommendations.

NOTE: The USCC does not assess whether or not, or to what extent, these directions are sound, sufficient or otherwise appropriate. It is the participant's responsibility alone to ensure that they are.

Compost Ingredients:

Yard trimming, food by-products

This compost product has been sampled and tested as required by the Seal of Testing Assurance Program of the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by calling Barnes Nursery at 800-421-8722. The USCC makes no warranties regarding this product or its contents, quality, or suitability for any particular use.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing Assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at <http://www.tmecc.org>.

Questions